

CURRICULUM VITAE**NAME** Jay M. Short, Ph.D.

Dr. Short is a founding member of Diversa Corporation, has served as Chief Technology Officer and Director of the company since its inception in 1994. He assumed the additional roles of President in 1998 and Chief Executive Officer in 1999. In February of 2000, Dr. Short led the company's highly successful initial public offering, which raised over \$200 million in gross proceeds – the largest biotechnology IPO ever completed at the time. Diversa was recently named one of the 100 most influential companies that will have the greatest influence on the future of human health. Diversa Corporation (NASDAQ: DVSA) is a leader in applying proprietary genomic technologies for the rapid discovery and optimization of novel products from genes and gene pathways.

EDUCATION

2003	Certified Director Director Training Program The Anderson Graduate School of Management, University of California, Los Angeles
1981 - 1985	Ph.D., Biochemistry Case Western Reserve University, Cleveland, Ohio
1980 - 1981	Graduate Study, Macromolecular Science Case Western Reserve University, Cleveland, Ohio
1976 - 1980	B.A. with Honors, Chemistry Taylor University, Upland, Indiana

RESEARCH & PROFESSIONAL EXPERIENCE

1999 - present	CEO and President Chief Technology Officer Board of Director Diversa Corporation San Diego, California
1998 - present	President and Chief Technology Officer Board of Director Diversa Corporation San Diego, California
1997 - 1998	Executive Vice President and Chief Technology Officer Board of Director Diversa Corporation San Diego, California
1994 - 1997	Chief Technology Officer Board of Director Diversa Corporation San Diego, California
1990 - 1994	President Stratacyte, Inc. La Jolla, California

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1992 - 1994	Vice President R&D (Research) and Operations Stratagene Cloning Systems La Jolla, California
1989 - 1992	Vice President R&D (Research) and Biological Operations Stratagene Cloning Systems La Jolla, California
1988 - 1989	Senior Staff Scientist Research and Development Stratagene Cloning Systems La Jolla, California
1985 - 1988	Staff Scientist Research and Development Stratagene Cloning Systems La Jolla, California
1981 - 1985	Ph.D. Research Case Western Reserve University Dr. Richard W. Hanson's Laboratory, Identification and characterization of the promoter for P-enolpyruvate carboxykinase. First identification of a cAMP regulatory domain. Cleveland, Ohio
1980 - 1981	Graduate Student Research Case Western Reserve University Dr. Bruce Roe's Laboratory, Analysis of the cellulase activity of <i>Trichoderma viride</i> . Cleveland, Ohio

TEACHING EXPERIENCE

Thesis Advisor, University of Uppsala, Sweden, Ph.D. for Michelle Alting-Mees 1988-1993
Lecturer, Committee for Advanced Scientific Education, Center for Drug Evaluation and Research, FDA 1992
Faculty, Transgenic Mouse Model and Its Application in Assessing *In Vivo* Mutagenesis, Genetic
Toxicology Workshop (3rd Annual) 1989
Microbiological Associates Inc., Bethesda, MD.
Faculty, DNA Cloning and Expression, Physiology Society Workshop, San Diego, CA. 1987
Teaching Assistant, Molecular & Cellular Biology, Case Western Reserve University, Cleveland, OH. 1981-1985
Teaching Assistant, Physiological Chemistry, Kent State University, Kent, OH. 1981
Teaching Assistant, Quantitative Analysis, Taylor University, Upland, IN. 1978-1980

CERTIFICATIONS

Certified Director	Director Training Program, University of California, Los Angeles, California The Anderson Graduate School of Management and The Harold Price Center
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for Entrepreneurial Studies

PADI Diver Certification

PROFESSIONAL EXPERIENCE

Diversa ranked # 2 among small companies for one of the best places for life scientists to work in this industry.
Diversa named one of the 100 most influential companies that will have the greatest influence on the future of human health, Acumen 2004

Diversa's patent portfolio ranked # 1 on the 2003 Patent Scorecard by the MIT Survey

Largest Biotechnology IPO raising over \$200MM

Founding management member of Diversa Corporation

Board Director, Diversa Corporation, San Diego, CA

Board Director, Invitrogen Corporation, Carlsbad, CA

Board Director, Stressgen Biotechnologies, Vancouver, Canada and San Diego, CA

Board Director, Senomyx Corporation, San Diego, CA

Board Director, YPO (Young Presidents' Organization), San Diego, CA

Board Director & Treasurer, Stressgen Therapeutics, Victoria, BC, Canada

Board Director & Secretary, Stressgen Therapeutics, Victoria, BC, Canada

Board Director & Compensation Chairman, Victoria, BC, Canada

Board Member Advisor, Chemical and Engineering News

Board Member, BioCom San Diego

Board Advisor, IngleWood Ventures

Board of Advisors and Founding Member, Division of Biological Sciences, UCSD

Board Director and Executive Committee, Zymetrics

Fellow, Lifetime, The Explorers Club, New York, NY

Committee Member BioCom Science & Technology, San Diego

Consultant, Stratagene Cloning Systems, La Jolla, CA

Consultant, Micro Product Systems, Lynn, IN

Consultant for European Economic Community on Transgenic Toxicology Testing 1991-1994

Chairman, Discussion Group, Society of Toxicology Conference 1993

Editor, Mutation Research

Judge on the U.S. National Entrepreneur of the Year 2003

Institutional Animal Care and Use Committee (IACUC), Chairman and Institutional Official

NIEHS Peer Review Committee

Panel Member for Chemical Science & Technology for NIST, National Research Council 1997-2000

SBIR Study Section

Reviewer for U.S. Congressional Office of Technology Assessment (OTA) on The Human Genome Project and Patenting DNA Sequences.

Reviewer for Proceedings of the National Academy of Sciences, Genetic Analysis Techniques, Analytical Biochemistry & Nucleic Acids Research

U.S. Committee Member for Evaluation of Biotechnology Research in Spain

Visiting Scientist, International Centre of Insect Physiology and Ecology (ICIPE), Kenya 2002-2004

MEMBERSHIPS

American Association for the Advancement of Science

American Chemical Society

American Men and Women of Science

American Society of Biochemistry and Molecular Biology

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American Society of Microbiology
BioCom San Diego
Environmental Mutagenesis Society
Japanese Environmental Mutagen Society
Science
Society for Industrial Microbiology
Society of Toxicology
The Explorers Club, Fellow Lifetime Member, New York
The New York Academy of Sciences
YPO (Young Presidents' Organization) San Diego
YPO (Young Presidents' Organization) International

AWARDS

Henry F. Whalen, Jr. Award for Business Development, American Chemical Society, 2004
Distinguished Alumnus Award for Professional Achievement, Taylor University, Upland, IN 2004
Taylor University nomination for CCCU Award (Council for Christian Colleges & Universities) 2003
Case Western Reserve University Alumni Profile 2003
bioFusion 03 Breakthrough Innovation in Science Award Nomination 2003
bioFusion 03 Life Science Leader of the Year Nomination 2003
bioFusion 03 Life Science Company of the Year Nomination 2003
ABL (Adaptive Business Leader) Innovations in HealthCare Gold Award 2003
Deloitte and Touche's Orange County / San Diego Technology "Fast 50" 2003
Finalists for UCSD Connect's Most Innovative New Product Award in the Biotechnology R&D Category 2002
Deloitte and Touche "Fast 500" Technology 2002
Deloitte and Touche's Orange County / San Diego Technology "Fast 50" 2002
The Premier Print Award, Annual Report 2002
Deloitte and Touche "Fast 500" Technology 2001
Ernst & Young San Diego Entrepreneur of the Year 2001
bioFusion 01 Life Science Innovator Award Nomination 2001
T-Sector Life Science Innovator Award 2001
Deloitte and Touche's Orange County / San Diego Technology "Fast 50" 2001
San Diego Business Journal StarCom Honor 2001
League of American Communication Professionals, Platinum Award, Annual Report 2001
Ernst & Young Finalist for San Diego Entrepreneur of the Year in 2000
The Premier Print Award, Annual Report 2001
American Men and Women of Science 1995
Who's Who Registry of Business Leaders 1994-1995
SBIR Annual Report Program Success Profile (Top 8 of 800 Companies) 1993
Stratagene Most Innovative Award - Managers/Supervisors 1992
Stratagene Innovation Award - Big Blue® Transgenic Testing System 1991
UCSD Connect Program 1st Place Award for Innovation and Entrepreneurship in Biotechnology 1991
UCSD Connect Program 1st Place Award for Innovation and Entrepreneurship in Biotechnology 1990
Stratagene Innovation Award - Lambda ZAP® vector 1990
Stratagene Service Award 1990
Award from the University of Victoria for Contributions to the Development of Short-term
Transgenic Mutation Assays
Nominated as Council Member for the U.S. Environmental Mutagen Society
PNIT Patent Award

MEDIA:

Jay M. Short, Ph.D.

ABC Discovery News, ABC San Diego Channel 10, Agricultural Genomics, BBC Radio, Billings Gazette, BioCentury, Bioinformed Newsletter, BioPeople Magazine, BioTech Today Radio Show, Biotechnology Newsletter, BioVentures View, BioWorld Today, Business Daily, Business Week, CBS MarketWatch Weekend, CEO Cast, Chemical Engineering, Chemical Week, Chemistry & Industry (UK), Chemistry, CNBC, CNN Science & Technology, CNN Sunday Weekend, CNN WorldView, dBusiness.com, Digital Jam, Discovery Magazine, Drug Discovery Today, Elsevier Science Ltd., Forbes, Forbes.com, Fox CONNECT, Fox 6 News San Diego, German RTL TV, Good Morning America, Horizon Air Magazine, Idea TV, Inside Business Radio Show, JAG Financial News, KCRA Channel 3, KBPS Radio, KFMB Channel 8, KGTV Channel 10, KPBS, KUSI, Life Technology, London Financial Times, Los Angeles Times, Modern Drug Discovery, NBC San Diego Channel 7/39, National Geographic, National Radio Report, Nature, Nature Biotechnology, New York Times, PBS, Pirateinvestor.com, R&D Magazine, Reuters, San Diego Business Journal, San Diego Business Transcript, San Diego Magazine, San Diego Metropolitan, San Diego Union Tribune, SIM, Scientist, Specialty Chemicals, Sp2 Magazine, Stewards' Watch, T-Sector Magazine, The Age Magazine, The Economist, The Motley Fool, The Discovery Channel, The Discovery Channel, Time Magazine, USA Today, Wall Street Journal, Wall Street Transcript, Washington Post

PATENTS

The Patent Scorecard for 2003 recognized Diversa's patent portfolio as being ranked # 1 by the MIT Survey. This ranking provides an overall assessment of a company's intellectual property power. This measure showcases the broader significance of a company's patents by examining how often its U.S. patents from the previous five years are cited as prior art in the current year's batch. A value of 1.0 represents average citation frequency, so, for example, a value of 1.4 would indicate a company's patents were cited 40 percent more often than the average. Diversa has a value of 14.43.

DNA Cloning Vectors with *in vivo* Excisable Plasmids 1987
 Mutagenesis Testing Using Transgenic Animals Carrying Marker Genes 1987
 Mutagenesis Testing Using Transgenic Non-Human Animals Carrying Test DNA Sequences 1987
 Dietary and Hormonal Regulation of Expression of Exogenous Genes in Transgenic Animals Under Control of the Promoter of the Gene
 Phosphoenolpyruvate Carboxykinase 1988
 A Transgenic Mouse for Measurement and Characterization of Mutation Induction *In Vivo* 1989
 Rapid Screening Mutagenesis and Teratogenesis Assay 1989
 A Combinatorial Approach to Regenerating the Immunoglobulin Repertoire in Prokaryotic Cells 1990
 Transgenic Animal Models for *In Vivo* Mutagenesis Testing 1990
 Polycos Vectors 1991
 A Lambda Packaging Extract Lacking β -Galactosidase Activity 1991
 A System for Regulation of Eukaryotic Genes 1991
 Methods for Phenotype Creation from Multiple Gene Populations 1991
 Transgenic Non-Human Animals Carrying Test DNA Sequences 1992
 Mutagenesis Testing Using Transgenic Non-Human Animals Carrying Test DNA Sequences 1992
 Selectable System Patent 1992
 Polycos Mutagenesis Systems 1993
 Use of Trans-acting Proteins for the Development of an *In Situ* Expression Screening System 1993
 Enzyme Kits and Libraries 1995
 Enzyme Activity Screening of Clones having DNA from Uncultivated Microorganisms 1995
 Enzyme Tiered 1995
 Method for Screening for Enzyme Activity 1995
 Combined Enzyme Screening/Evolution 1995
 Uncultured/Activity Screening 1995
 Directed Evolution of Thermophilic Proteins 1995
 Combinatorial Enzyme Development (Directed Mutagenesis) 1996
 Protein Activity Screening of Clones having DNA from Uncultivated Microorganisms 1996
 Production and Use of Normalized DNA Libraries 1996

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Methods of DNA Shuffling with Polynucleotides Produced by Blocking or Interrupting a Synthesis or Amplification Process 1996
Method of Screening for Enzyme Activity (Biopanning) 1996
Directed Evolution of Thermophilic Enzymes 1996
Environmental Biopanning 1996
Combinatorial Enzyme Development 1996
Enzyme Activity Screening of Clones Having DNA from Uncultivated Microorganisms 1996
Normalized Samples/Libraries 1996
Reassembled Pools of Mutagenized DNA & Procedure 1996
Fluorescent-based Single Screening for Enzymes 1996
High Throughput Screening for Novel Enzymes 1997
Nucleotide Sequence of the *Aquifex aeolicus* Genome, Fragments Thereof, and Uses Thereof 1997
Screening for Novel Bioactivities 1997
Screening for Novel Compounds which Regulate Biological Interactions 1997
Method for Screening Enzyme Activity 1997
High Throughput Screening for Novel Enzymes 1997
"Discovery" (whole process, including uncultivated, normalized, biopanning, screening, evolving, (etc.) 1997
Production of Enzymes Having Desired Activities By Mutagenesis 1999
Protein Activity Screening of Clones Having DNA from Uncultivated Microorganisms 1999
Method of DNA Reassembly by Interrupting Synthesis 1999
Production and Use of Normalized DNA Libraries 1999
Enzyme Kits and Libraries 1999
Screening for Novel Bioactivities 2000
Method for Screening for Enzyme Activity 2000
Screening for Novel Bioactivities 2000
Production and Use of Normalized DNA Libraries 2000
Method of Screening for Enzyme Activity 2000
Screening Methods for Enzymes and Enzyme Kits 2001
Saturation Mutagenesis in Directed Evolution 2001
High Throughput Screening for Novel Enzymes 2001
Recombinant Bacterial Phytases and Uses Thereof 2001
Methods Useful for Nucleic Acid Sequencing Using Modified Nucleotides Comprising Phenylboronic Acid 2001
End Selection in Directed Evolution 2001
Gene Expression Library Produced From DNA From Uncultivated Microorganisms and Method for Making the Same 2001
Directed Evolution of Thermophilic Enzymes 2002
Method for Screening for Enzyme Activity 2002
Exonuclease-Mediated Gene Assembly in Directed Evolution 2002
End Selection In Directed Evolution 2002
Exonuclease-Mediated Gene Assembly in Directed Evolution 2002
Screening for Novel Bioactivities 2002
Method of DNA Shuffling with Polynucleotides Produced or Blocking or Interrupting Synthesis or Amplification Process 2002
Production and Use of Normalized DNA Libraries 2002
Sequence Based Screening 2002
Non-Stochastic Generation of Genetic Vaccines 2002
Altered Thermostability of Enzymes 2003
Screening Methods for Enzymes and Enzyme Kits 2003
Methods for Identifying a Desired Enzymatic Activity 2003
Enzymes Kits and Libraries 2003
Method for Screening for Enzyme Activity 2003
Protein Activity Screening of Clones having DNA from Uncultivated Microorganisms 2003
High Throughput Screening of Mycelia for Bioactivities of Biomolecules 2003
Screening for Novel Bioactivities 2003
Coated Surfaces for Selective Enrichment of Microbial Populations 2003

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Recombinant Bacterial Phytases and Uses Thereof 2003
 Synthetic Ligation Reassembly in Directed Evolution 2003
 Process for Generating Optimized Molecules from a Manmade Library of Polynucleotides made by Combinatorial Saturation Mutagenesis (amended) 2003
 Exonuclease-Mediated Nucleic Acid and Reassembly in Directed Evolution 2003
 Methods for Purifying Annealed Doubled-Stranded Oligonucleotides Lacking Base Pair Mismatches 2004
 End Selection in Directed Evolution 2004
 Protein Activity Screening of Clones having DNA from Uncultivated Microorganisms 2004
 Method of Screening for Enzyme Activity 2004
 Exonuclease-Mediated Gene Assembly in Directed Evolution (3/23/04 new issuance) 2004
 Directed Evolution of Thermophilic Enzymes (3/30/04 new issuance) 2004
 Non-Stochastic Generation of Genetic Vaccines and Enzymes 2004
 Directed Evolution of Thermophilic Enzymes 2004
 Over 350 Additional Pending Patent Applications Worldwide.

GRANTS AND CONTRACTS

- *Phase I Small Business Contract #N43-Am-62282. 1985-1986 P.I.
 Vectors and Techniques for Rapid DNA Sequencing
- *Phase II Small Business Contract #N43-Am-62282. 1988-1990 P.I.
 Vectors and Techniques for Rapid DNA Sequencing
- *Phase I Small Business Grant 2R43ES04484-02. 1986-1987 P.I.
 Identification of Genetic Lesions Leading to Mutations
- *Phase II Small Business Grant 2R43ES04484-02. 1989-1992 P.I.
 Identification of Genetic Lesions Leading to Mutations
- *1R01-ES04728-01A1. 1989-1992. (NIEHS) P.I.
 Animal Model for Identification of Genetic Lesions
- *Phase I Small Business Grant #R43GM42291-01. 1989 P.I.
 Switch Mechanism for Gene Expression in Transgenics
- *RFP NIH-ES-88-11. 1989-1994. (NIEHS) Co-I.
 Development of Mutagenesis Assays Using Transgenic Mice
- *Phase II Small Business Grant #2R44GM42291-02. 1990-1992 (DRG/NIH) P.I.
 Switch Mechanism for Gene Expression in Transgenics
- *Phase I Small Business Grant #1R43GM46585-01. 1991 (DRG/NIH) P.I.
 Generation of a Peptide Screening System Through the Development of
 Combinatorial-splicing "Polycos" Vectors
- *Phase I Small Business Grant #1R43CA57066-01. 1992 (NCI) P.I.
 Transgenic Rats: A Short-term Mutagenicity Assay for Multi-species Testing of Suspected Human Carcinogens
- *Phase I Small Business Grant #1R43GM48300-01. 1992. (DRG/NIH) P.I.
 Analysis of the Immunoglobulin Hypermutator Mechanism
- *Phase I Small Business Grant #1R43ES06146-01. 1992 (NIEHS) P.I.
 Selectable "Polycos" Shuttle Vectors for In Vivo Mutagenicity Testing
- *Phase II Small Business Grant #2R44GM46585-02. 1992-1994 (NIGMS) P.I.
 Peptide Screening Utilizing Combinatorial Polycos Vector
- *Phase I Small Business Grant #1R43RR08667-01. 1992-1993 (DRG/NIH) Co-I.
 A One-step PCR Cloning System Based on FLP Recombination
- *Phase II Small Business Grant #2R44CA57066-02. 1993-1995 (NCI) P.I.
 Transgenic Rats: Transgenic Rat Model for Mutagenicity Testing
- *Phase I Small Business Grant. 1993-1994 (NIH) Co-I.
 Transgenic Fish Model for Mutagenicity Testing
- *Phase II Small Business Grant 1994-1996 (NIH) P.I.

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"Polycos" Shuttle Vectors for Mutagenicity testing
*Phase I Small Business Grant. 1994 (NIH) Co-I.
Vector System for Studying Protein-Protein Interactions
*CRADA with LLNL. 1994 (NIH) Co-I.
Mouse and Rat Painting Probes
*CRADA with FDA. 1994 (NIH) Co-I.
Tamoxifen Testing in F-344 Rats
*CRADA with NASA. 1994 (NIH) Co-I.
Radiation Damage in the Microgravity Environment

ABSTRACTS AND INVITED LECTURES:

Over 200 Abstracts and Invited Lectures.

PUBLICATIONS:

1. Yoo-Warren, H., Monahan, J.E., Short, J.M., Short, H., Bruzel, A., Wynshaw-Boris, A., Meisner, H.M., Samols, D., and Hanson, R.W. (1983) Isolation and Characterization of the Gene Coding for Cytosolic Phosphoenolpyruvate Carboxykinase (GTP) from the Rat. *Proc. Natl. Acad. Sci. U.S.A.*, 80:3656-3660.
2. Wynshaw-Boris, A., Lugo, T.G., Short, J.M., Fournier, R.E.K., and Hanson, R.W. (1984) Identification of cAMP Regulatory Region in the Gene for Rat Cytosolic Phosphoenolpyruvate Carboxykinase (GTP): Use of Chimeric Genes Transfected into Hepatoma Cells. *J. Biol. Chem.*, 259:12161-12169.
3. Wynshaw-Boris, A., Lugo, T.G., Short, J.M., Fournier, R.E.K., and Hanson, R.W. (1985) A Region of the Gene for Rat Cytosolic P-enolpyruvate Carboxykinase Confers cAMP Responsiveness to the HSV-thymidine Kinase Gene. In: *Membrane Receptors and Cellular Recognition*, (M. Czech and C.R. Kahn, eds.), Alan Liss Inc., New York, pp 339-346.
4. Wynshaw-Boris, A., Short, J.M., and Hanson, R.W. (1986) Characterization of the Phosphoenolpyruvate Carboxykinase (GTP) Promoter-Regulatory Region. I. Multiple Hormone Regulatory Elements and the Effects of Enhancers. *J. Biol. Chem.*, 261:9714-9720.
5. Short, J.M., Wynshaw-Boris, A., Short, H.P., and Hanson, R. W. (1986) Characterization of the Phosphoenolpyruvate Carboxykinase (GTP) Promoter-Regulatory Region. II. Identification of cAMP and Glucocorticoid Regulatory Domains. *J. Biol. Chem.*, 261:9721-9726.
6. Wynshaw-Boris, A., Short, J.M., and Hanson, R.W. (1986) The Determination of Sequence Requirements for Hormonal Regulation of Gene Expression. *Biotechniques*, 4:104-119.
7. Burns, D.M., Bhandari, G., Short, J.M., Sanders, P.G., Wilson, R.H., and Miller, R.E. (1986) Selection of a Rat Glutamine Synthetase cDNA Clone. *Biochemical and Biophysical Research Communications*, 134:146-151.
8. Hod., Y. Cook, J.S., Weldon, S.L., Short, J.M., Wynshaw-Boris, A., and Hanson, R.W. (1986) Differential Expression of the Genes for the Mitochondrial and Cytosolic Forms of P-enolpyruvate Carboxykinase Gene. In: *Metabolic Regulation: Application of Recombinant DNA Techniques*, (A.G., Goodridge and R.W. Hanson eds.), Annals of the New York Academy of Sciences, New York, Vol. 278, pp. 31-45.
9. Wynshaw-Boris, A., Short, J.M., and Hanson, R.W. (1987) *cis* - acting Regulatory Elements in Hormonally Responsive Genes. In: *Progress in Nucleic Acid Research and Molecular Biology* (W.E. Cohn and K. Moldave eds.), Academic Press, Inc., Orlando, Florida, 34:59-87.

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10. Bullock, W., Fernandez, J.M., and Short, J.M. (1987) XL1-Blue: A High Efficiency Plasmid Transforming *recA* *E.coli* Strain With β -Galactosidase Selection. *Biotechniques*, 5:60-64.
11. Short, J.M., Fernandez, J.F., Sorge, J.A., and Huse, W. (1988) Lambda ZAP[®]: A Bacteriophage Lambda Expression Vector With *In Vivo* Excision Properties. *Nucleic Acids Res.*, 16:7583-7600.
12. Short, J.M. (1988) Book Review: Vectors - A Survey of Molecular Cloning Vectors and Their Uses. Raymond L. Rodriguez and David T. Denhardt, eds, Butterworths, Stoneham, MA. *Genomics*, 2:270-271.
13. Short, J.M., and Pollard, A. (1988) Gigapack XL: Size Selective Packaging Extract. *Strategies in Mol. Biol.*, 1:5-7.
14. Kretz, P.L., and Short, J.M. (1989) Gigapack II: A Restriction Deficient (*mcrA*-, *B*-, *hsd*-, *mrr*-) Lambda Packaging Extract. *Strategies in Mol. Biol.*, 2(2):25-26.
15. Kretz, P.L., Reid, C.H., Greener, A., and Short, J.M. (1989) Effect of Lambda Packaging Extract M_{cr} Restriction Activity on DNA Cloning. *Nucleic Acids Res.* 17:5409.
16. Sastry, L., Alting-Mees, M., Huse, W.D., Short, J.M., Sorge, J.A., Hay, B.N., Janda, K.D., Benkovic, S.J., and Lerner, R.A. (1989) Cloning of the Immunological Repertoire in *E. coli* for Generation of Monoclonal Catalytic Antibodies I. Construction of a V_H Specific cDNA Library. *Proc. Natl. Acad. Sci. U.S.A.*, 86:5728-5732.
17. Short, J.M. (1989) The Use of Lambda Phage Shuttle Vectors in Transgenic Mice for Development of a Short Term Mutagenicity Assay. In: *Fifth International Conference on Environmental Mutagens*, Alan Liss, Inc., New York, Part A:335-367. Article and Lecture.
18. Alting-Mees, M., and Short, J.M. (1989) pBluescript II: Gene Mapping Vectors. *Nucleic Acids Res.*, 17:9494.
19. Shopes, B., Alting-Mees, M., Amber, J.R., Ardourel, D., Callahan, M., Detrick, J., Hay, B.N., Hogrefe, H.H., Greener, A., Gross, E.A., Kubitz, M.M., Mullinax, R.L., Wilson, C., Short, J.M., and Sorge, J.A. (1990) Bacteriophage Immuno-expression Libraries: An Emerging Technology for the Identification and Production of Monoclonal Antibodies. *Antibody Engineering, New Tech. & Application Implications*. pp. 98-101.
20. Alting-Mees, M., Amberg, J., Ardourel, D., Elgin, E., Greener, A., Gross, E.A., Kubitz, M., Mullinax, R.L., Short, J.M., and Sorge, J.A. (1990) Monoclonal Antibody Expression Libraries: A Rapid Alternative to Hybridomas. *Strategies in Mol. Biol.*, 3:1-9.
21. Kohler, S., Provost, S., Dyaico, M., Sorge, J., and Short, J.M. (1990) Development of a Short-term, *In Vivo* Mutagenesis Assay: The Effects of Methylation on the Recovery of a Lambda Phage Shuttle Vector from Transgenic Mice. *Nucleic Acids Res.*, 18:3007-3013.
22. Kohler, S., Provost, G.S., Kretz, P.L., Fieck, A., and Short, J.M. (1990) An *In Vivo* Assay Using Transgenic Mice to Analyze Spontaneous and Induced Mutations at the Nucleic Acid Level. *Strategies in Mol. Biol.*, 3:19-21.
23. Kretz, P., Kohler, S., and Short, J.M. (1990) The Effect of *E. coli* Minute 98 Locus on DNA Containing Eukaryotic Modifications. *Strategies in Mol. Biol.*, 3:21-22.
24. Mullinax, R.L., Gross, E.A., Amberg, J., Hogrefe, H., Kubitz, M., Greener, A., Alting-Mees, M., Ardourel, D., Hay, B.N., Short, J.M., Sorge, J.A., and Shopes, B. (1990) Identification of Human Antibody Fragment Clones Specific for Tetanus Toxin in a Bacteriophage Lambda Immuno-Expression Library. *Proc. Natl. Acad. Sci. U.S.A.*, 87:8095-8099.

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25. Cline, J., Lundberg, K., Nielson, K., Sorge, A., Short, J.M., and Mathur, E.J. (1990) StrataClean Resin: Non-Toxic Protein Extraction. *Strategies in Mol. Biol.*, 4(4):49-51.
26. Mullinax, R.L., Gross, E.A., Amber, J.R., Hay, B.N., Hogrefe, H.H., Kubitz, M.M., Greener, A., Alting-Mees, M., Ardourel, D., Short, J.M., Sorge, J.A., and Shopes, B. (1990) Human Antibody Clones Isolated From a Bacteriophage Lambda Immunoexpression Library. *Strategies in Mol. Biol.*, 4(4):51-52.
27. Provost, G.S., Kohler, S.W., Fieck, A., Kretz, P.L., Molina, T., and Short, J.M. (1990) Short-term Germ Line and Somatic Cell Mutagenesis Testing With *LacI* Lambda Phage Shuttle Vectors in Transgenic Mice. *Strategies in Mol. Biol.*, 4(4):55-56.
28. Kohler, S.W., Provost, G.S., Kretz, P.L., Fieck, A., Sorge, J.A., and Short, J.M. (1990) The Use of Transgenic Mice for Short Term, *In Vivo* Mutagenicity Testing. *Genetic Analysis Techniques*, 7(8):212-218.
29. Shopes, B., Mullinax, R.L., Amber, J.R., Gross, E.A., Hay, B.N., Hogrefe, H.H., Kubitz, M.M., Greener, A., Alting-Mees, M., Ardourel, D., Short, J.M., and Sorge, J.A. (1990) ImmunoZAP[®] Bacteriophage Libraries: A New Technology for the Identification and Expression of Monoclonal Antibodies. *Biotech USA Conference Proceedings*, pp.332-341.
30. Raleigh, E.A., Benner, J., Bloom, F., Braymer, H.D., DeCruz, E., Dharmalingam, K., Heitman, J., Noyer-Weidner, M., Piekarowicz, A., Kretz, P.L., Short, J.M., and Woodcock, D. (1991) Nomenclature Relating to Restriction of Modified DNA in *Escherichia coli*. *Journal of Bacteriology*, 173(8):2707-2709.
31. Kretz, P., Kohler, S., and Short, J.M. (1991) Identification and Characterization of a Gene Responsible for Inhibiting Propagation of Methylated DNA Sequences in *mcrA*, *mcrB1* *E. coli* Strains. *Journal of Bacteriology*, 173:4707-4716.
32. Kohler, S.W., Provost, G.S., Fieck, A., Kretz, P.L., Bullock, B., Sorge, J. A., Putman, D., and Short, J.M. (1991) Spectra of Spontaneous and Induced Mutations Using a Lambda ZAP[®] *LacI* Shuttle Vector in Transgenic Mice. *Proc. Natl. Acad. Sci. U.S.A.*, 88(18):7958-7962.
33. Wyborski, D., and Short, J.M. (1991) Analysis of Inducers of the *E.coli* *Lac* Repressor System in Mammalian Cells and Whole Animals. *Nucleic Acids Research*, 19:4647-4653.
34. Lundberg, K.L., Shoemaker, D.D., Adams, M.W.W., Short, J.M., Sorge, J.A., and Mathur, E.J. (1991) High Fidelity Amplification With a Thermostable DNA Polymerase Isolated from *Pyrococcus Furiosus*. *Gene*, 108:1-6.
35. Kohler, S.W., Provost, G.S., Fieck, A., Kretz, P.L., Bullock, W.O., Putman, D.L., Sorge, J.A., and Short, J.M. (1992) Analysis of Spontaneous and Induced Mutations in Transgenic Mice Using a Lambda ZAP[®]/*LacI* Shuttle Vector. *Environmental and Molecular Mutagenesis*, 18:316-321.
36. Fieck, A., Wyborski, D., and Short, J.M. (1992) Modifications of the *E. coli* *Lac* Repressor for Expression in Eukaryotic Cells: Effects of Nuclear Signal Sequences on Protein Activity and Nuclear Accumulation. *Nucleic Acids Research*, 20:1785-1791.
37. Hay, B., and Short, J.M. (1992) ExAssistTM Helper Phage and SOLRTM Cells for Lambda ZAP[®] II Excisions. *Strategies in Mol. Biol.*, 5:16-18.
38. Short, J.M. (1992) Tissue Specific Mutagenesis in Transgenic Mice. *The Toxicology Forum, 1992 Annual Winter Meeting*, pp.79-109.
39. Alting-Mees, M.A., Sorge, J.A., and Short, J.M. (1992) pBluescript II: Multifunctional Cloning and Mapping Vectors. *Methods in Enzymology*, 216:483-495.

Jay M. Short, Ph.D.

40. Short, J.M., and Sorge, J.A. (1992) *In Vivo* Excision Properties of Bacteriophage Lambda ZAP® Expression Vectors. *Methods in Enzymology*, 216:495-508.
41. Short, J.M. (1992) Transgenic Animals for Carcinogenicity and Genotoxicity Testing. *Biotechnology International, The Global Review of Industry Manufacture and Application 1992*. Section.2. pp. 91-99.
42. Provost, G.S., Hamner, R., Kretz, P.L., and Short, J.M. (1992) Response to the Commentary Article: Comparison of Mutation Frequencies Obtained Using Transgenes and Specific-locus Mutation Systems in Male Mouse Germ Cells. *Mutation Research*, 298:145-147.
43. DuCoeur, L.C., Wyborski, D.L., and Short, J.M. (1992) Control of Gene Expression in Eukaryotic Cells Using the Lac Repressor System. *Strategies in Mol. Biol.*, 5(3):70-72.
44. Jerpseth, B., Greener, A., Short, J.M., Viola, J., and Kretz, P.L. (1992) XL1-Blue MRF: McrA-, McrCB-, Mrr-, HsdRMS- derivative of XL1-Blue. *Strategies in Mol. Biol.*, 5(3):81-83.
45. Alting-Mees, M., Hoener, P., Ardourel, D., Sorge, J., and Short, J.M. (1992) ZAP Express™ and pBK-CMV, pBK-RSV Phagemid Vectors for Prokaryotic and Eukaryotic Expression. *Strategies in Mol. Biol.*, 5(3):58-61.
46. Short, J.M., Provost, G.S., Kretz, P.L., and Dyaico, M.J. (1992) Overview of the Big Blue® *In Vivo* Mutagenesis Assay. *Mammalian Mutagenesis Study Group Communication – JEMS.MMS*, 6:73-89.
47. Lundberg, K.S., Kretz, P.L., Provost, G.S., and Short, J.M. (1993) The Use of Selection in Recovery of Transgenic Targets for Mutation Analysis. *Mutation Research Letters*, 301/2:99-105.
48. Mirsalis, J., Provost, G.S., Matthews, C., Hamner, R., Schindler, J.E., O'Loughlin, K., MacGregor, J.T., and Short, J.M. (1993) Induction of Hepatic Mutations in *LacI* Transgenic Mice. *Mutagenesis*, 8:265-271.
49. Alting-Mees, M.A., Vaillancourt, P., and Short, J.M. (1993) Phagemids and Other Hybrid Vectors. In: *Plasmids: A Practical Approach*. (ed. K. Hardy). IRL Press, pp. 197-223.
50. Provost, G.S., Kretz, P.L., Dyaico, M., Lundberg, K., and Short, J.M. (1993) Transgenic Systems for *In Vivo* Mutation Analysis. *Mutation Research*, 288:133-149.
51. Hedden, V., Callen W., Short, J.M., and Kretz, K. (1993) Improved Sequence Analysis of Mutations Identified With the Big Blue® System. *Strategies in Mol. Biol.*, 6:27-28.
52. Jerpseth, B., Greener, A., Short, J.M., Viola, J., and Kretz, P.L. (1993) New Restriction-Minus Derivatives of XL1-Blue *E. coli* Cells. *Strategies in Mol. Biol.*, 6:24.
53. Vaillancourt, P., Wyborski, D.L., and Short, J.M. (1993) The FLASH® CAT Kit: A Fast, Sensitive CAT Assay Without Radioactivity. *Strategies in Mol. Biol.*, 5:17-19.
54. Short, J.M., Dyaico, M.J., Provost, G.S., Kretz, P.L., Rogers, B.J., Ardourel, D., Wyborski, D.L. and Moores, J.C. (1993) Transgenic Mice and Rats for Tissue Specific Mutation Analysis. *JEMS*, 22:45-46.
55. Alting-Mees, M.A., and Short, J.M. (1993) Polycos Vectors: Filamentous Phage Packaging Using Lambda Extracts. *Gene*, 137:93-100.
56. Piegorsch, W.W., Lockhart, A.C., Margolin, B.H., Tindall, K.R., Gorelick, N.J., Short, J.M., Carr, G.J., and Shelby, M.D. (1994) Sources of Variability in Data from a *lacI* Transgenic Mouse Mutation Assay. *Environmental & Molecular Mutagenesis*, 23:17-31.

Jay M. Short, Ph.D.

57. Dyaico, M., Provost, G.S., Kretz, P.L., Ransom, S.L., Moores, J.C. and Short, J.M. (1994) The Use of Shuttle Vectors for Mutation Analysis in Transgenic Mice and Rats. *Mutation Research*, 307:461-478.
58. Wyborski, D.L., Malkhosyan, S., Moores, J.C., Dyaico, M.J., and Short, J.M. (1994) Rat2 Cell Line for *In Vitro* Mutagenicity Testing. *Strategies in Mol. Biol.*, 7(2):55-56.
59. Provost, G.S. and Short, J.M. (1994) Characterization of Mutations Induced by Ethylnitrosourea in Seminiferous Tubule Germ Cells of Transgenic B6C3F1 Mice. *Proc. Natl. Acad. Sci. U.S.A.*, 91:6564-6568.
60. Kretz, P.L., Wells, S., and Short, J.M. (1994) Gigapack III: A Single Tube *In Vitro* Lambda Packaging Extract. *Strategies in Molecular Biology* 7:44-45.
61. Knoll, A., Jacobson, D., Kretz, P., Lundberg, K., Short, J., and Sommer, S. (1994) Tissue-Specific Patterns of Spontaneous *LacI* Mutations Recovered From Transgenic Mice. *Mutation Research* 311:57-67.
62. Ashby, J., Short, J.M., Jones, N.J., Lefevre, P.A., Martin, E., Parry, J.M., Burnette, K., Glickman, B.W., and Tinwell, H. (1994) Mutagenicity of o-anisidine to the bladder of *lacI*- transgenic B6C3F1 mice: Absence of ¹⁴C or ³²P bladder DNA adduction. *Carcinogenesis* 15:2291-2296.
63. Altling-Mees, M. and Short, J.M. (1994) Rapid Excision Systems. *Strategies in Molecular Biology* 7(3):70-72.
64. Snead, M., Kretz, P.L., Short, J.M. (1994) Methods for Generating Plant Genomic Libraries. *Plant Molecular Biology Manual* H1:1-19.
65. Rogers, B., Provost, G.S., Young, R., Putman, D.L., and Short, J.M. (1995) Intralaboratory Optimization and Standardization of Mutant Screening Conditions Used for a Lambda/*LacI* Transgenic Mouse Mutagenesis Assay (I). *Mutation Research* 327:57-66.
66. Young, B., Rogers, B., Provost, G.S., Short, J.M., and Putman, D. (1995) Interlaboratory Comparison of Liver Spontaneous Mutant Frequency from Lambda/*LacI* Transgenic Mice (Big Blue®) (II). *Mutation Research* 327:67-73.
67. Callahan, J. and Short, J.M. (1995) Transgenic $\square/lacI$ Mutagenicity Assay: Statistical Determination of Sample Size. *Mutation Research* 327:201-208.
68. Wyborski, D.L., Malkhosyan, S., Moores, J.C., Dyaico, M.J., Perucho, M. and Short, J.M. (1995) Development of a Rat Cell Line Containing a Lambda Shuttle Vector for *In Vitro* Mutagenicity Testing. *Mutation Research* 334:161-165.
69. Snead, M.A., Kretz, P.L., and Short, J.M. (1995) Methods for Generating Plant Genomic Libraries. *Plant Molecular Biology Manual*, Kluwer Academic Publishers: Belgium (H1, 1-19).
70. Robertson, D.E., Mathur, E.J., Swanson, R.V., Marrs, B.L., and Short, J.M. (1996) The Discovery of New Biocatalysts From Microbial Diversity. *SIM News* 46:3-8.
71. Knoll, A., Jacobson, D.P., Nishino, H., Kretz, P.L., Short, J.M., and Sommer, S. (1996) A Selectable System for Mutation Detection in the Big Blue® *lacI* Transgenic Mouse System: What Happens to the Mutational Spectrum Over Time. *Mutation Research* 352:9-22.
72. Wyborski, D.L., DuCoeur, L.C., and Short, J.M. (1996) The Effect of Chromosome Position and Operator Placement on Lac Repressor Control in Eukaryotic Cells and Transgenic Mice. *Environmental and Molecular Mutagenesis*. 28:447-458.
73. Sick, A.J., Fernandez, J. and Short, J.M. (1996) Multiple Purpose Cloning Vectors. *Molecular Biology* (published).

Jay M. Short, Ph.D.

74. Snead, M., Alting-Mees, M.A., and Short, J.M. (1997) cDNA Library Construction for the Lambda ZAP® - Based Vectors. *Methods in Molecular Biology, cDNA Library Protocols*. Humana Press 69:39-51.
75. Snead, M., Alting-Mees, M.A., and Short, J.M. (1997) Clone Excision Methods for the Lambda ZAP® - Based Vectors. *Methods in Molecular Biology, cDNA Library Protocols*. Humana Press 69:53-60.
76. Short, J.M. (1997) Recombinant Approaches for Accessing Biodiversity. *Nature Biotechnology* 15:1322-1323.
77. Nichols, W.S., Geller, S.A., Edmond, V.J., Dyaico, M.J., Sorge, J.A., and Short, J.M. (1998) Hepatocarcinogenesis (Z#2) / mutagenesis during initiation stage. *Mutation Research* 398:143-149.
78. Snead, M., Alting-Mees, M.A., and Short, J.M. (1998) cDNA Library Construction for Lambda ZAP® - Based Vectors. *Methods in Molecular Biology, Plant Virology Protocols*. Humana Press 81:255-267.
79. Bruggeman, T., Short, J.M., and Simms, P. (1998) Diversa: Catalyzing a Revolution. *Industrial Biotech News* 1(1):4,14-15.
80. Deckert, G., Warren, P.V., Gaasterland, T., Young, W.G., Lenox, A.L., Graham, D.E., Overbeek, R., Snead, M., Keller, M., Aujay, M., Huber, R., Feldman, R.A., Short, J.M., Olsen, G.J., and Swanson, R.V. (1998) The Complete Genome of the Hyperthermophilic Bacterium *Aquifex aeolicus*. *Nature* 392:353-358.
81. Sick, A.J., Fernandez, J., Short, J.M., (1998) Multipurpose Cloning Vectors. *Recombinant DNA Principles and Methodologies* 491-522.
82. Li, J., Robertson, D.E., Short, J.M., Wang, P.G. (1999) Chemical and enzymatic synthesis of glycoconjugates. 5: One-pot regioselective synthesis of bioactive galactobiosides using a CLONEZYME thermophilic glycosidase library. *Bioorganic & Medicinal Chemistry Letters* Jan 4; 9 (1):35-8
83. Snead, M.A., Alting-Mees, M.A., Short, J.M. (2000) cDNA Library Construction for the Lambda ZAP® - Based Vectors. *Nucleic Acid Protocols Handbook*, Humana Press Part V:355-365.
84. Sehgal, A.C., Callen W., Mathur E. J., Short, J.M., Kelly, R.M. (2001) Carboxylesterase from *Sulfolobus Solfataricus* P1. *Methods in Enzymology* 330:461-471.
85. Cady, S.G., Bauer, M.W., Callen, W., Snead, M.A., Mathur, E.J., Short, J.M., Kelly, R.M. (2001) Beta-Endoglucanase from *Pyrococcus Furiosus*. *Methods in Enzymology* 330:346-354.
86. Miller, E.S., Kimberley, Parker, N., Liebl, W., Lam, D., Callen, W., Snead, M.A., Mathur, E.J., Short, J.M., Kelly, R.M. (2001) Alpha-D-galactosidases from *Thermotoga* Species. *Methods in Enzymology* 330:246-260.
87. Chhabra, S., Parker, K.N., Lam, D., Callen, W., Snead, M.A., Mathur, E.J., Short, J.M., Kelly, R.M. (2001) Beta-mannanases from *Thermotoga* Species. *Methods in Enzymology* 330:224-238.
88. Parker, K.N., Chhabra, S.R., Lam, D., Callen, W., Duffaud, G.D., Snead, M.A., Short, J.M., Mathur, E.J., Kelly, R.M. (2001) Galactomannanases Man2 and Man5 from *Thermotoga* species: growth physiology on galactomannans, gene sequence analysis, and biochemical properties of recombinant enzymes. *Biotechnology and Bioengineering* Nov 5;75 (3):322-33
89. Gray, K.A., Richardson, T.H., Kretz, K., Short, J.M., Bartnek, F., Knowles, R., Kan, L., Swanson, P.E., Robertson, D.E. (2001) Rapid Evolution of Reversible Denaturation and Elevated Melting Temperature in a Microbial Haloalkane Dehalogenase. *Advanced Synthesis & Catalysis* 2001, 343:607-617.

Jay M. Short, Ph.D.

90. Richardson, T.H., Tan, X., Frey, G., Callen, W., Cabell, M., Lam, D., Macomber, J., Short, J.M., Robertson, D., Miller, C. (2002) A Novel, High Performance Enzyme for Starch Liquefaction: Discovery and Optimization of a Low pH, Thermostable α -amylase. *Journal of Biological Chemistry* 2002, 277(29), 26501-26507.
91. Zengler, K., Toledo, G., Rappe, M., Elkins, J., Mathur, E.J., Short, J.M., Keller, M. (2002) Cultivating the Uncultured. *Proceedings of the National Academy of Sciences of the United States of America* (2002), 99(24), 15681-15686.
92. Murphy, K.M., Broman, K.W., Ziegler, J.S., Wyborski, D.L., Joe, L.K., Smith, D.W., Thurston, L.M., Stevenson, S.E., McClelland, M., Short, J.M., Mathur, E.J., Varley, J.D. (2002) Successful Breeding Among Free-Ranging 10-Month-Old Gray Wolves (*Canis Lupus*) in Yellowstone National Park, Wyoming. (in press) *Yellowstone Center for Resources* (2002). Kerry M. Murphy (kerry_murphy@nps.gov), P.O. Box 168, Yellowstone National Park, WY 82190.
93. Waters, E., Hohn, M.J., Ahel, I., Graham, D.E., Adams, M.D., Barnstead, M., Beeson, K.Y., Bibbs, L., Bolanos, R., Keller, M., Kretz, K., Lin, X., Mathur, E., Ni, J., Podar, M., Richardson, T., Sutton, G.G., Simon, M., Soll, D., Stetter, K.O., Short, J.M., Noordewier, M. The Genome of *Nanoarchaeum Equitans*: Insights into Early Archaeal Evolution and Derived Parasitism. *Proceedings of the National Academy of Sciences* (2003), Volume 100, No. 22, 12984-12988.
94. Robertson, D.E., Chaplin, A., DeSantis, G., Podar, M., Madden, M., Chi, E., Richardson, T., Milan, A., Miller, M., Weiner, D.P., Wong, K., McQuaid, J., Farwell, B., Preston, L.A., Tan, X., Keller, M., Mathur, E., Kretz, P.L., Burk, M.J., Short, J.M. Exploring Nitrilase Sequence Space for Enantioselective Catalysis. *Applied and Environmental Microbiology* (2004), Volume 70, No. 4, 2429-2436.
95. Palackal, N., Brennan, Y., Callen, W.N., Dupree, P., Frey, G., Goubet, F., Hazlewood, G.P., Healey, S., Kang, Y.E., Kretz, K.A., Lee, E., Tan, X., Tomlinson, G.L., Verruto, J., Wong, V., Mathur, E.J., Short, J.M., Robertson, D.E., Steer, B.A. An Evolutionary Route to Xylanase Process Fitness. *Protein Science* (2004), 13:494-503.
96. Garrett, J.B., Kretz, K.A., O'Donoghue, E., Kerovuo, J., Kim, W., Barton, N.R., Hazlewood, G.P., Short, J.M., Robertson, D.E., Gray, K.A. Enhancing the Thermal Tolerance and Gastric Performance of a Microbial Phytase for Use as a Phosphate-Mobilizing Monogastric Feed Supplement. *Applied and Environmental Microbiology* (2004), Volume 70, No. 5, 3041-3046.
97. YaLi Brennan, Walter N. Callen, Leif Christoffersen, Paul Dupree, Florence Goubet, Shaun Healey, Myrian Hernandez, Martin Keller, Ke Li, Nisha Palackal, Ana Sittenfeld, Giselle Tamayo, Steve Wells, Geoffrey P. Hazlewood, Eric J. Mathur, Jay M. Short, Dan E. Robertson, and Brian A. Steer. *Unusual Microbial Xylanases from Insect Guts. Applied and Environmental Microbiology* (2004), Volume 70, No. 6. 3609-3617
98. Kretz, K.A., Richardson, T.H., Gray, K.A., Robertson, D.E., Tan, X., Short, J.M. Gene Site Saturation Mutagenesis (GSSM); A Comprehensive Mutagenesis Technique in Protein Engineering. Robertson, D.E., and Noel, J., eds., *Methods of Enzymology* (2004), Volume 388 (in press).